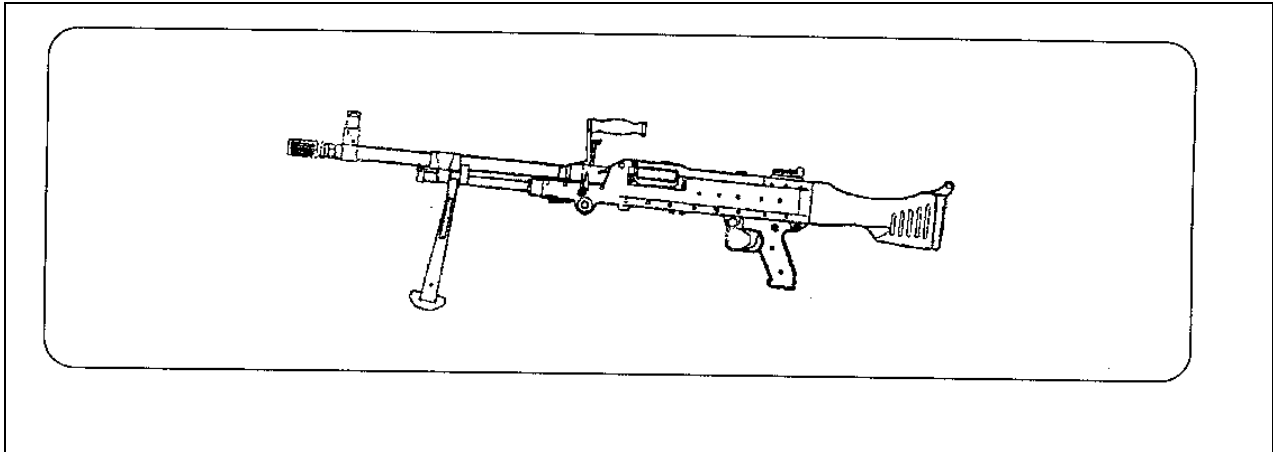


UNITED STATES MARINE CORPS  
Basic Officer Course  
The Basic School  
Marine Corps Combat Development Command  
Quantico, Virginia 22134-5019

B2121

**MEDIUM MACHINE GUN 1****Student Handout**

1.       **The M240G Medium Machine Gun** is a result of a Marine Corps search for a machine gun that could fire at an extended range with greater dependability and accuracy than the M60E3. The search wasn't long, for the machine gun chosen was already in the Marine Corps inventory. The M240 machine gun is found on the LAV and M-1 Abrams Main Battle Tank. The M240G is the ground variant and is made by Fabrique Nationale of Herstal, Belgium, the same manufacturer of the Squad Automatic Weapon. A European version, called the FN MAG 58 (Mitailleuse a Gaz), is used by over 100 different services throughout the world and is the premier machine gun used in NATO. The M240G is a battle-proven machine gun that has demonstrated many times the highest possible performance levels in combat throughout the world.



2.       **M240G Machine Gun General Description.** The M240G machine gun is a 7.62 mm, air-cooled, belt-fed, gas-operated automatic weapon.

3.       **General Data**

a.       Weight

Gun (M240G)       25.6 lbs  
Tripod (Complete with flex-mount,  
traversing and elevating mechanism)   20.0 lbs  
Spare barrel case, complete with

spare barrel and all SL-3 components 12.9 lbs

b. Muzzle velocity 2800 feet per second

c. Range

Maximum effective range 1800 meters

Maximum range 3725 meters

Grazing fire 600 meters

d. Rates of fire

Sustained 100 rpm

Rapid 200 rpm

Cyclic 650-950 rpm

e. Rifling twist 1 turn in 12

f. Ammunition. The M240G fires a standard 7.62 mm cartridge. Normal issue is 100-round bandoleers, two per can, eight per case. Standard mix is four ball rounds to one tracer. A 100-round bandoleer weighs about seven pounds. There are five types of rounds:

- (1) Ball
- (2) Tracer (red tip)
- (3) Armor-piercing (black tip)
- (4) Blank
- (5) Dummy

4. **General Disassembly.** General disassembly (field stripping) is the separation of the M240G into the five main groups. (See Figure 2.) They are the buttstock group, operating group, trigger housing group, barrel group, and receiver group. Refer to FMFRP 6-15 for more detailed information on general disassembly and assembly.

Figure 2. Five main groups

- a. Clearing procedures. Clear gun procedures are always the first step whenever handling a weapon.
  - (1) Grasp the cocking handle and pull the bolt to the rear.
  - (2) Place the gun on safe.
  - (3) Open the cover, raise the feed tray, and inspect the chamber both visually and physically.
  - (4) Place the gun on fire.
  - (5) Grasp the cocking handle, squeeze the trigger, and slowly allow the bolt to return to its forward position.
  - (6) After the gun is cleared, general disassembly begins with the bolt forward, and the cover raised.
- b. Removing the buttstock group
  - (1) Depress the buttstock latch located on the underside of the buttstock where it joins the receiver.
  - (2) Slide the buttstock upward and remove it from receiver.

Figure 3. Removing buttstock

- c. Removing the operating group
  - (1) To remove the drive spring rod assembly first push in against its base, then lift up and outward so that it clears its retaining studs inside the receiver. Then remove it from the rear of the receiver.

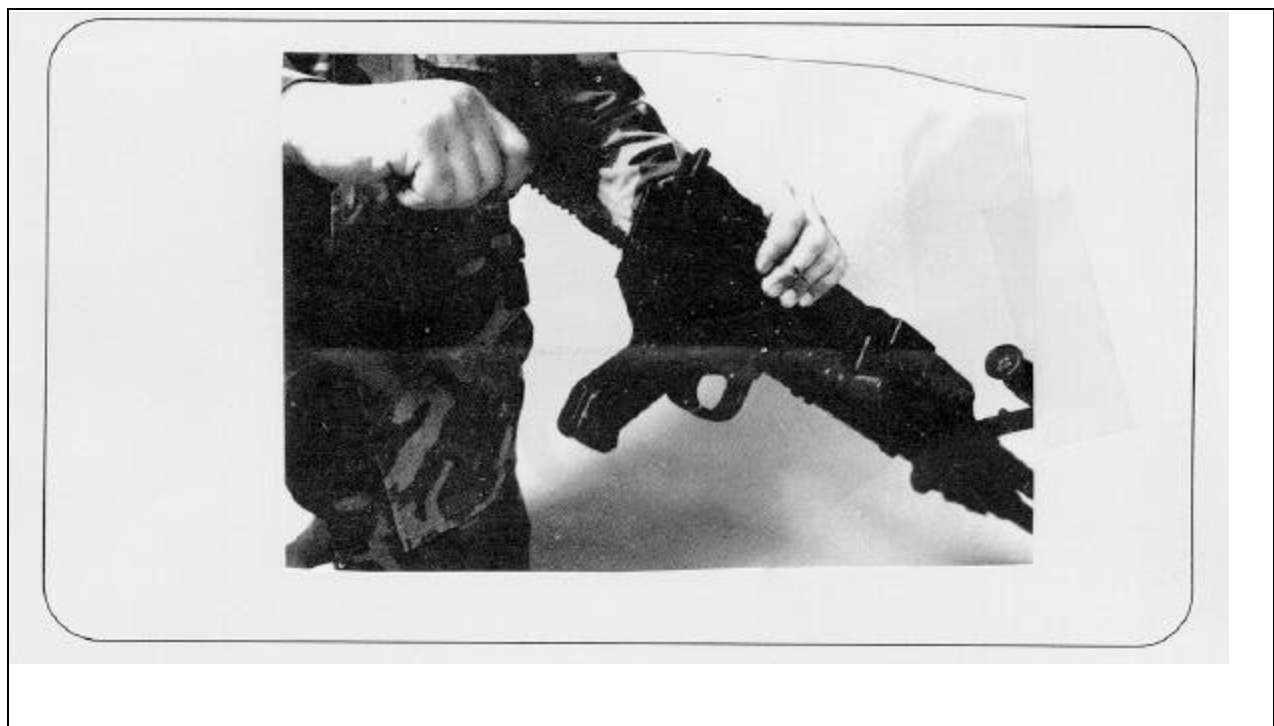


Figure 4. Removing drive spring rod assembly

(2) Pull the cocking handle to the rear to start the rearward movement of the bolt and operating assembly inside the receiver. With the index finger, reach inside the top of the receiver and push rearward on the face of the bolt until the bolt and operating rod assembly are exposed at the rear of the receiver.

NOTE: In order to take out the bolt and operating rod you must depress the trigger.

(3) Grasp the bolt and operating rod assembly and remove it from the rear of the receiver.



Figure 5. Removing bolt and operating rod

- (4) The operating group consists of the operating rod, bolt, and drive spring rod assembly.
- d. Removing the trigger housing group.
  - (1) Remove the trigger housing assembly spring pin.



Figure 6. Removing trigger housing assembly spring pin

(2) Rotate the rear of the trigger housing assembly down, disengage the holding notch at the front of the assembly from its recess on the bottom of the receiver and remove the assembly from the receiver.



Figure 7. Removing trigger housing assembly

(3) The trigger housing group consists of the trigger housing assembly and the trigger housing assembly spring pin.

e. Removing the barrel group.

(1) Depress the barrel locking latch located on the left side of the receiver where the barrel joins the receiver.



Figure 8. Depressing barrel locking latch

(2) Grasp the barrel changing handle, and rotate it to an upright position. Then push forward and pull up, separating the barrel from the receiver.





Figure 9. Removing barrel

(3) The barrel group consists of the barrel with attached gas system, adjustable front sight assembly, flash suppresser, and barrel changing handle.

f. The receiver group

(1) The receiver group consists of the receiver with rear sight, cover, feedtray, and bipod assembly.

(2) General disassembly is completed after the removal of the other main groups from the receiver group.

5. **Detailed Disassembly.** Detailed disassembly and assembly involves removing and replacing component parts of some of the main groups. Although further disassembly of the operating, barrel, and receiver groups is authorized at the unit level, it should be kept to a minimum to reduce the possibility of damaging or losing parts. Operators will not perform detailed disassembly on the buttstock and trigger housing groups.

a. Operating group

(1) To separate the operating rod and bolt remove the spring-loaded pin that holds them together. Then, pull the bolt forward until it is clear of the firing pin, thus disengaging the bolt from the operating rod.

Figure 10. Separating the bolt

(2) This completes detailed disassembly of the operating group. The firing pin remains affixed to the operating rod and the ejector and extractor remain affixed to the bolt. These parts are removed by ordnance personnel only.

b. Barrel group

(1) Hold the barrel at the point where the gas system attaches to it. Twist the gas collar counter-clockwise until it releases from the gas plug. Remove the collar from the gas plug.



Figure 11. Releasing the collar

(2) Slide the gas plug to the rear out of the gas regulator. This completes detailed disassembly of the barrel group.

Figure 12. Removing the gas plug

c. Receiver group

- (1) To remove the cover and feedtray, first raise the cover straight up.
- (2) Then pull the hinge spring pin out and lift the cover and feedtray from the receiver. This completes detailed disassembly of the receiver group.

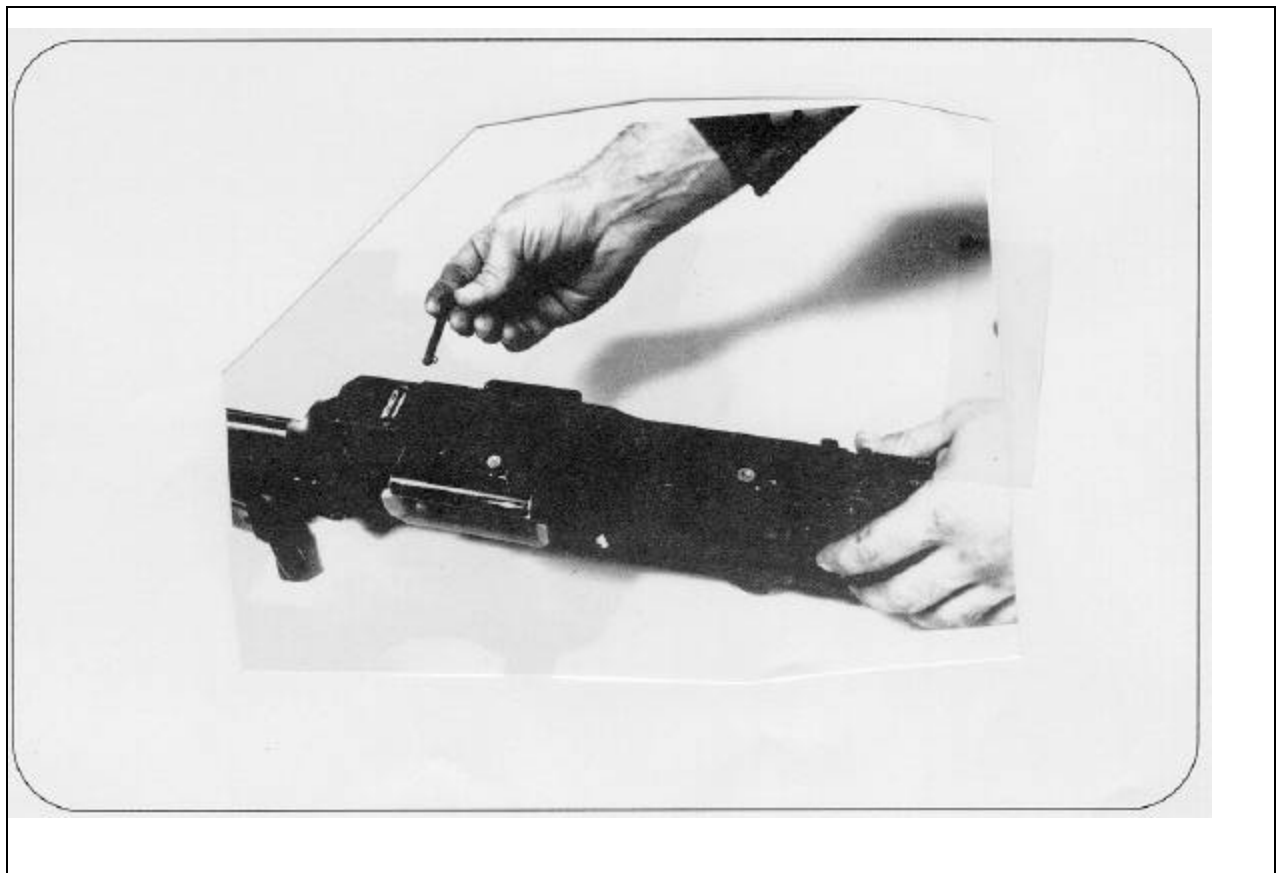


Figure 13. Separating the cover from the receiver



Figure 14. Detailed disassembly

## 6. Detailed Assembly

### a. Receiver group

(1) To replace the feedtray, lay the feedtray on the receiver so that the feedtray guides are aligned with the receiver brackets.

(2) To replace the cover, place the cover onto the receiver aligning its mounting holes with mounting brackets on the receiver, and push it down into its closed position. Then, insert the cover hinge spring pin into the holes to affix the cover and feed tray to the receiver.

### b. Barrel group

(1) Insert the gas plug into the gas regulator.

(2) Place the collar over the forward end of the plug. Push against face of the collar while rotating counter-clockwise until it locks into place. Pull on the collar to ensure it is in the locked position.

### c. Operating group

(1) To join the bolt and operating rod, hold the rod in one hand, then position the rear of the bolt and slide it over the firing pin.

(2) Align the holes on the bolt with those on the operating rod and push the spring-loaded pin through them to secure the two assemblies together. The pin can be inserted from the left or right.

7. **General Assembly.** General assembly is replacing the other main groups on the receiver group. It is accomplished in reverse order of disassembly.

### a. Replacing the barrel group

(1) Insert the barrel socket into the receiver forward of the cover and align the rear of the gas plug with the gas cylinder tube in front of the bipod.

(2) Depress the barrel locking latch and fully seat the barrel in the receiver. Release the barrel locking latch and rotate the barrel changing handle down to its lowered position to lock the barrel in place.

### b. Replacing the trigger housing group

(1) Insert the holding notch on the front of the trigger housing into its recess on the bottom of the receiver. Rotate the rear of the trigger housing upward and align the hole of the trigger housing with the mounting bracket on the receiver.

(2) Insert the trigger housing assembly spring pin into the hole, securing the assembly to the receiver. It can be inserted from left or right.

### c. Replacing the operating group

(1) Insert the bolt and operating rod into the receiver, aligning the slots along their sides with the rails inside the receiver. Extend the bolt to the unlocked (forward) position and then push the entire bolt and operating rod assembly inside the receiver.

(2) Pull the trigger so that the assembly can slide all the way into the receiver.

(3) Insert the drive spring rod assembly into the receiver sliding it all the way forward against the recess in the rear of the operating rod. Then lower it so that its base seats against the retaining studs inside the receiver that hold it into place.

- d. Replacing the buttstock group
  - (1) Align the recessed grooves at the front of the buttstock with the vertical rails at the rear of the receiver.
  - (2) Slide the buttstock downward until it locks in place on the receiver.
- e. Function check
  - (1) To check for correct assembly, pull the cocking handle to the rear and return it to its forward position.
  - (2) Close the cover.
  - (3) Pull the cocking handle to the rear.
  - (4) With the safety on fire, pull the trigger and ride the bolt home by maintaining rearward pressure on the cocking handle as the bolt goes forward.

8. **The Flex-Mount.** In addition to the standard M122 tripod and traversing and elevating mechanism, the M240G utilizes a flex-mount to enhance the stability of the tripod platform. The flex-mount also absorbs and dampens the recoil caused when the weapon is fired.

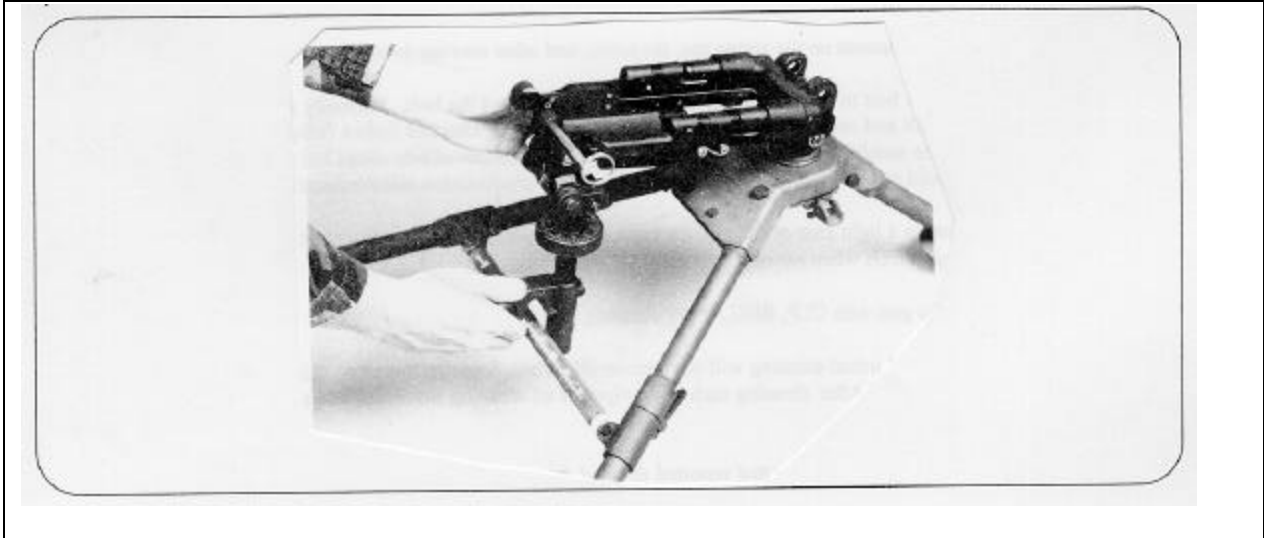


Figure 15. The flex-mount



a. Mounting the gun

(1) The preferred method of mounting the gun is to first attach the flex-mount to the tripod and then mount the gun on the flex-mount.

(2) The flex-mount attaches to the tripod by first inserting its pintle into the tripod's pintle bushing and then engaging the pintle locking lever to hold it in place.

(3) The gun attaches to the flex-mount by first pushing the recesses on the forward portion of the receiver on the bottom of the receiver against the forward bushings on the flex-mount. Then rotate the rear of the gun down to the mount and insert the retaining pin forward of the trigger housing assembly to lock the weapon in place. This completes mounting.

b. Dismounting the gun

(1) The preferred method of dismounting the gun is to first remove the flex-mount's rear retaining pin, raise up on the rear of the gun and then pull the gun back disengaging it from the mount's forward bushing.

(2) To remove the flex-mount from the tripod first unlock the traversing slide lock (turn the lever counter-clockwise). Then disengage the pintle lock and raise the pintle and entire mount up and off the tripod.

9. **Care and Cleaning**

a. Each gun should be cleaned as soon after firing as possible and each time it is exposed to field conditions. In combat conditions the gun should be cleaned and lubricated daily whether or not it has been fired. If possible, keep the gun covered with a canvas, tarpaulin, or poncho when not in use. During normal training conditions, inspect the gun daily for rust, and maintain a light coat of CLP on all metal parts. In ideal conditions, when the gun is not used and is kept in a clean place, it may only be necessary to disassemble and clean it every three to five days. The gun should be disassembled, cleaned and lubricated in a clean, dry location where it is least exposed to dirt and moisture.

b. Cleaning materials authorized at the unit level are: Cleaner, lubricant, and preservative (CLP), rifle bore cleaner (RBC), and dry cleaning solvent. Use CLP or bore cleaner for daily maintenance and to remove minor carbon buildup after firing.

c. The lubricants authorized for field use on the M240G are: Cleaner, lubricant, and preservative (CLP); lubricating oil, weapons (LAW); lubricating oil, weapons, semi-fluid (LSA); lubricating oil, weapons, semi-fluid with Teflon (LSA-T). These lubricants are used to lubricate parts before, during, and after firing.

10. **Actions to be Taken Before, During, and After Firing**

a. Before firing. Inspect for cleanliness, proper mechanical condition, missing or broken parts. Remove excess oil from the bore, chamber, barrel socket, and face of the bolt. Lubricate the gun by placing a light coat of CLP on the following parts:

(1) Operating rod. On those recesses along the side which make contact with the receiver rails.

(2) Bolt. A very small amount on the spring pin, the roller, and other moving parts.

(3) Receiver. With the bolt to the rear, a line of CLP on either side of the bolt. Manually pull the bolt back and forth, so the CLP is spread over the bolt and receiver rails. Headspace should also be checked before firing. To do this rotate the barrel changing handle and count the number of clicks heard. There must be minimum of two clicks but not more than seven. If this is not the case, the weapon should not be fired. It should be turned in for higher echelon maintenance/inspection.

b. During firing. Maintain a light coat of CLP on the parts listed in paragraph 10a, and ensure that the connections of the gas system remain tight. Change barrels when necessary.

c. After firing. Clean the gun with CLP, RBC, or dry cleaning solvent.

(1) Even the most careful initial cleaning will not remove all carbon deposits; therefore, it is necessary to clean the gun for three consecutive days after firing. After cleaning each day, wipe off all cleaning materials, and place a light coat of CLP on all metal parts.

(2) If the gun is fired daily, remember that repeated detailed disassembly will cause unnecessary wear. Adequate cleaning can be performed on a gun which has been disassembled into its five main groups; it is essential to perform

detailed disassembly only after prolonged firing. Ensure that cleaning materials such as CLP and RBC are not used on the non-metallic portions of the gun, such as the buttstock. Hot water, rags, and non-abrasive brushes can be used to remove dirt from these parts.

(3) The M122 tripod should be cleaned to remove all dirt; then a light coat of CLP should be applied, especially to the sleeve and sleeve latch.

#### 11. Climatic Conditions

a. Cold climates. In cold climates, the M240G must be kept free of excess lubricants, cleaners, and moisture, all of which can freeze and cause the gun to operate sluggishly. If brought indoors, allow the gun to come to room temperature, wipe completely dry, and lubricate with a light coat of CLP. In temperatures between 10 degrees Fahrenheit and -10 degrees Fahrenheit, the M240G should be lubricated with CLP, LSA, or LAW. In sustained temperatures below -10 degrees Fahrenheit use LAW only.

b. Hot, humid climates. In hot, humid climates, inspect more frequently for rust and keep free of moisture. Ensure that the gun is lubricated properly with LSA, LSA-T, or CLP. Generally a heavier application of lubricant is required.

c. Hot, dry climates. In hot, dry climates, sand and dust must be kept from collecting in working parts. Clean the gun daily with CLP. Wipe dry. The Teflon coating left by the CLP or LSA-T will be sufficient to keep the parts working smoothly.

#### 12. Inspection

a. The gun should be mounted on the M122 tripod and placed on a poncho with the spare barrel case. The exact position of the gun and contents of the spare barrel case may be specified by the inspecting officer or, in his absence, by the unit leader. The traversing and elevating mechanism should be centered. The bolt should be forward, and the cover raised. Always check for cleanliness, but also look for broken, missing, or burred parts; test the spring tension of appropriate parts, and perform certain checks to determine if the gun functions properly. The gun should be inspected in an orderly, set sequence so no part is overlooked and no time is wasted. Each inspector will develop the exact sequence, but it may be convenient to first inspect the gun, then the mount.

##### (1) Inspection of the M240G

(a) Conduct clear gun procedures per paragraph 4a..

(b) Start with the cover. Always look for cleanliness, but carefully check parts and components for serviceability and proper function. Pull the feed arm back and forth to make sure that the fork and pivot arm freely move along with the outer and inner feed pawls. Check for tight spring tension on the feed arm control spring. Push the feed pawls up against the plate to test their spring tension.

(c) Run your finger over the receiver rails to check for carbon. See if the drive spring is rusted.

(d) Ensure the weapon is on fire, pull the bolt all the way to the rear and release the cocking handle. If the bolt did not remain to the rear, the sear shoulder or sear notch is excessively worn. Next inspect the forward portion of the receiver rails, the face of the bolt, and the chambering ramp in the receiver. Verify that the extractor and ejector are present. Ensure that the bolt moves freely between its locked and unlocked positions.

(e) Inspect one side of the receiver, then remove the barrel. Examine the barrel socket, chamber, and bore for cleanliness, burrs, and cracks. Make sure the gas plug and collar fit together tightly. To see if the gas system is relatively free of carbon, take it apart and inspect the gas portals on the plug to ensure that they are clear. Inspect the bipod assembly by lowering and raising the legs. Replace the barrel, examine the rear sight, and inspect the other side of the receiver.

(f) Next, test the mechanical condition of the trigger housing group, specifically the safety. With the weapon on safe and bolt to the rear, pull the trigger; the bolt should remain to the rear. If the bolt went forward, the safety is defective.

(g) With the weapon on fire and the cover closed, pull the trigger and ride the bolt home slowly by holding the cocking handle. Riding the bolt home slowly will prevent damage to the cam roller and feedtray. Return the gun to its original position, that is, with the bolt forward, and cover raised.

##### (2) Inspection of the mount

(a) First, see if the weapon is mounted correctly; that the flex-mount is properly seated, the

pintle is attached properly, that the tripod is extended fully, and that the T&E mechanism is not positioned backwards.

(b) Direct your attention to the T&E mechanism. Determine if the scales can be read without difficulty. Manipulate the traversing and elevating handwheel to examine the cleanliness of the far ends of the traversing and elevating screws. At the same time, perform a function check by testing for dead clicks. Dead clicks are present when, while turning either handwheel, the barrel does not move. It means the gears inside the T&E are excessively worn, and the T&E should be replaced. Also, grasp the stock, and gently pull the gun back and forth to test for inordinate play in M122 mount. Determine if the slide lock lever firmly holds the T&E to the traversing bar.

(c) Examine the tripod and flex-mount for rust. One particular spot to check is inside the shoes of the tripod legs.

(d) Inspect the gun bag and spare barrel bag for signs of deterioration and wear. Ensure that it contains all required SL-3 components, and examine the spare barrel as described above.

(e) When inspecting, return all parts to their original position before moving on to another part.

### 13. Immediate Action

a. **Malfunction.** A malfunction is a failure of the gun to function satisfactorily; the gun will fire, but fires improperly. Defective ammunition or improper operation of the gun is not considered a malfunction. Two of the more common malfunctions are sluggish operation and runaway gun.

(1) **Sluggish operation.** Instead of firing at its normal rate (approximately 9-10 rounds per second), a sluggish gun fires very slowly. It can be due to lack of lubrication or loss of gas. The action taken to reduce sluggish operation is to move the regulator setting to the number 2 or 3 position. The remedy for continued sluggish operation is to clean, lubricate, tighten, or replace parts as required.

(2) **Runaway gun.** In this case the gun continues to fire after you have released the trigger; firing is uncontrolled. A runaway gun is caused by a worn, broken, or burred sear; the sear shoulder is unable to grab the operating rod and hold it to the rear. An excessively worn sear notch on the operating rod could also be the cause. The action taken to stop a runaway gun, for both tripod and bipod mounted guns, is for the team leader to twist and break the belt of ammunition. The remedy for runaway gun is to replace worn parts.

b. **Stoppages.** A stoppage is any interruption in the cycle of functioning caused by faulty action of the gun or defective ammunition; in short, the gun stops firing. Stoppages must be cleared quickly and firing resumed. Apply immediate action.

(1) **Immediate action** is that action taken by the gunner/crew to reduce a stoppage, without investigating its cause, and quickly return the gun to action. Two terms used to describe ammunition condition should be understood in conjunction with immediate action.

(a) **Hang fire.** A hang fire occurs when the cartridge primer has detonated after being struck by the firing pin but some problem with the propellant powder causes it to burn too slowly and this delays the firing of the projectile. Time (five seconds) is allotted for this malfunction before investigating the stoppage further because injury to personnel and damage to equipment could occur if the round went off with the cover of the weapon open.

(b) **Cook off.** A cook off occurs when the heat of the barrel is high enough to cause the propellant powder inside the round to ignite even though the primer has not been struck. Immediate action is completed in a total of 10 seconds to ensure that the round is extracted prior to the heat of the barrel affecting it. When the round fails to extract/eject further action is delayed, (15 minutes) if the barrel is hot because the gunner must assume that a round is still in the chamber and could cook off at any time prior to the barrel cooling off.

(2) Procedures for immediate action.

(a) Wait five seconds after misfire to guard against a hang fire.

(b) Within the next five seconds, (to guard against a cook off) pull the cocking handle to the rear, observe feeding and ejecting. If brass was ejected, attempt to fire. If brass did not eject, place weapon on safe, determine hot or cold barrel. Hot barrel is 200 rounds, or more, fired in the last two minutes. If you have a hot barrel wait 15 minutes and execute remedial action.

14. **Remedial Action.** When immediate action fails to reduce the stoppage, remedial action must be taken. This involves investigating the cause of the stoppage and may involve some disassembly of the weapon and replacement of parts to correct the

problem. Two common causes of a stoppage that may require remedial action are failure to extract due to a stuck or ruptured cartridge.

a. Stuck cartridge. Some swelling of the cartridge occurs when it fires. If the swelling is excessive the cartridge will be fixed tightly in the chamber. If the extractor spring has weakened and does not tightly grip the base of the cartridge then it may fail to extract the round when the bolt moves to the rear. Once the bolt is locked to the rear, the weapon is on safe, and the barrel has been allowed to cool, a length of cleaning rod should be inserted into the muzzle to push the round out through the chamber.

b. Ruptured cartridge. Sometimes a cartridge is in weakened condition after firing. In addition it may swell as described above. In this case a properly functioning extractor may sometimes tear the base of the cartridge off as the bolt moves to the rear leaving the rest of the cartridge wedged inside the chamber. The ruptured cartridge extractor must be used in this instance to remove it. The barrel must be removed and the extractor inserted into the chamber where it can grip and remove the remains of the cartridge.

#### 15. Loading

a. Raised cover. To load with the cover raised, the bolt must be to the rear and the safety lever on safe.

(1) The team leader, who is the assistant gunner, takes a belt of ammunition with the open side of the links down and places the first round against the cartridge stops, aligning it with the feed aperture.

(2) The gunner closes the cover (while the team leader holds the belt to ensure that the first round does not slip away from the cartridge stops) and places the safety on fire.

(3) The gun is loaded and ready to fire.

b. Closed cover. To load with the cover closed and the bolt forward, the safety must be on fire.

(1) The team leader takes a belt of ammunition with the open side of the links down and forces the first round into the feedway until the holding pawl engages it and holds it in place.

(2) The gunner pulls the cocking handle to the rear and returns the handle forward.

(3) The gun is loaded and ready to fire.

#### 16. Unloading and Clearing the Gun

a. Unloading. Whether or not the belt is expended, unloading procedures are essentially the same; all ammunition must be removed, and the chamber must be checked. The exact unloading procedures are:

(1) The gunner pulls the bolt to the rear (in case all rounds in the belt have been expended), places the weapon on safe, raises the cover, and the team leader clears the feedtray of ammunition and links.

(2) The gunner inspects the chamber by lifting the feedtray.

(3) If the chamber is clear, unloading is completed.

b. To ensure the gun is safe, perform clear gun procedure. This is done after the gun has been unloaded properly, and is similar to the unloading procedure.

(1) After the gun is properly cleared, the gunner puts the safety on fire, pulls the cocking handle to the rear, pulls the trigger, and rides the bolt home. Then the gunner pulls the bolt to the rear and returns the safety to safe.

(2) The team leader runs a cleaning rod down the bore. When the gunner sees the tip of the cleaning rod in the chamber, he sounds off "gun clear", and the team leader removes the cleaning rod. The gunner then places the gun in a safe position: bolt forward, safety on safe, and cover raised. The result of properly executing the clear gun procedure is a safe gun.

#### 17. Change Barrel Procedures

a. The ability to change the barrels of the M240G quickly provides a great advantage. It allows a barrel to be used while the other is cooling. This increases the life of each barrel and ensures a continuous rapid rate of accurate fire. Barrels should be changed when they are beginning to overheat. Changing a barrel only takes a few seconds and significantly improves the rate of fire and accuracy. As a guide, a barrel change is required after firing the sustained rate for 10 minutes and after firing the rapid rate for 2 minutes. The procedures outlined below are for a tripod mounted gun; however, they are very similar to those for a bipod mounted gun.

b. The barrel can be changed with the bolt forward or to the rear. The weapon does not necessarily need to be unloaded; however, it must be placed on safe when the bolt is to the rear. The gunner depresses the barrel locking latch with his left hand and keeps his hand in that position. The team leader grasps the barrel by the changing handle, rotates it to its upright position pushes forward and pulls up, separating the barrel from the receiver. He then grasps the spare barrel by the changing handle and with the gunner again depressing the barrel locking latch, inserts the barrel socket into the receiver, aligns the gas plug with the gas cylinder, and pulls to the rear until the barrel is fully seated. The gunner then releases the barrel release latch. Once the barrel is fully seated, the team leader lowers the barrel changing handle counting the clicks to ensure proper headspace (minimum two, maximum seven clicks).

## 18. Traversing and Elevating Mechanism (T&E)

### a. Nomenclature

Figure 16. The T&E mechanism

b. Reading and recording data. After firing and adjusting onto a target, a reading can be taken from the T&E mechanism. If this data is recorded, it can later be reapplied (during any condition of visibility) and fired on, giving us first round hits on the target.

(1) The first step is to center the offset head and lay the gun on target. When possible, fire and adjust on the target, being careful to make direction changes by means of the traversing bar (not the T&E). Then record the firing data, which consists of two elements: a direction reading and an elevation reading.

(2) Direction reading. This data is taken from two sources: the direction of the muzzle and the traversing bar with scale.

(a) Muzzle direction. Left or right of center. When the T&E mechanism is to the right of "0" on the traversing bar with scale, the muzzle direction is left; and when the T&E mechanism is to the left of "0" on the traversing bar with scale, the muzzle direction is right.

(b) The traversing bar is graduated in five mil increments and numbered every 100 mils from zero (in the center) to 450 mils on the left side and 425 mils on the right. The reading is taken from the first five mil index line visible to the left edge of the traversing bar slide.

(3) Elevation reading. This data is taken from the scale on the upper elevating screw with scale and the scale on the elevating handwheel.

(a) Read the number above the first line visible above the elevating handwheel.

(b) The second portion is the number indicated on the elevating handwheel scale. When written, the elevation reading are separated by a slash (/).

(4) A complete T&E reading consists of a combination of the traversing and elevating readings.

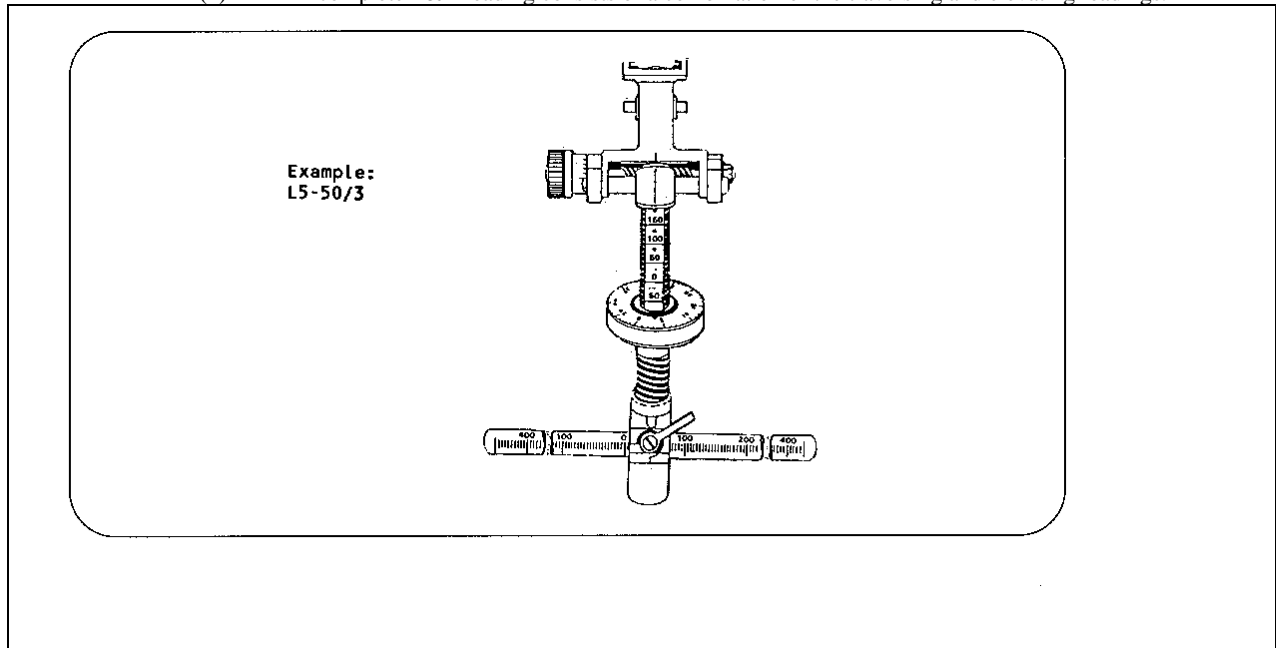


Figure 17. Reading the T&E

#### 19. Manipulation

a. General. Remember the gunner's position when firing from the tripod: right hand on the trigger housing and left hand on the T&E mechanism. All manipulation is accomplished with the left hand only.

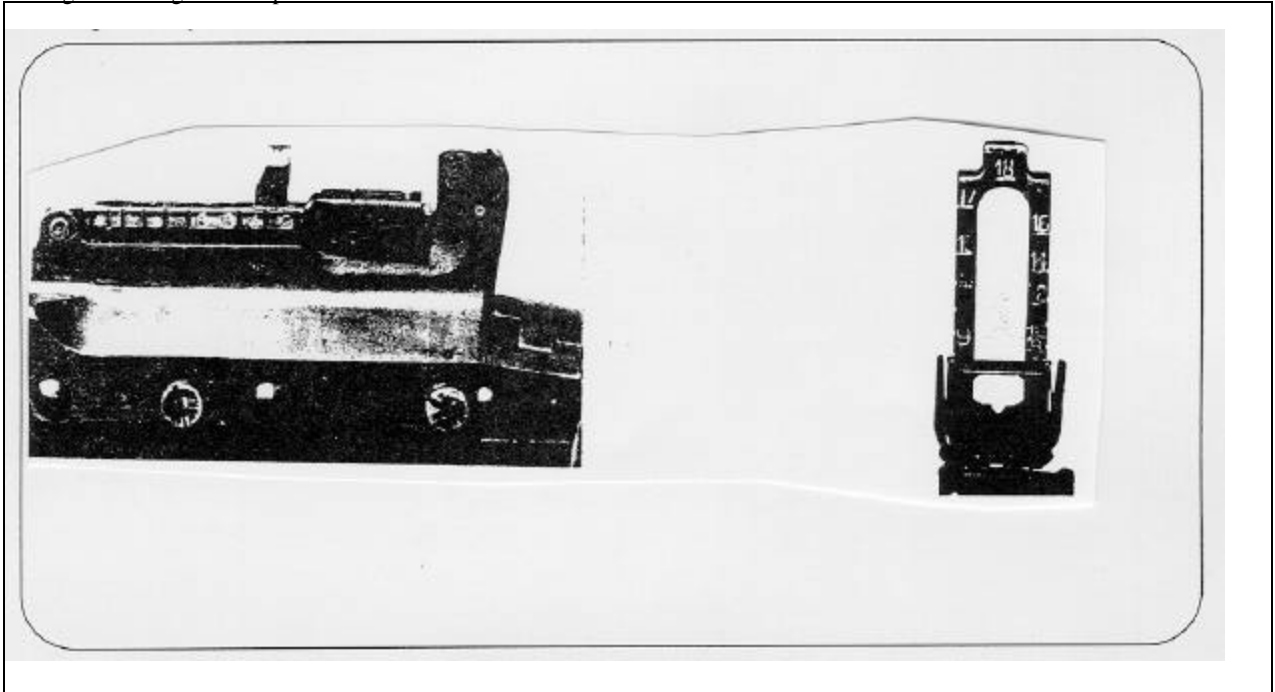
b. Traversing. Major directional changes are accomplished by unlocking the traversing slide lock lever and sliding the T&E along the traversing bar with scale. Minor directional changes are made with the traversing handwheel using the left hand. Thumb-up, grasp the traversing handwheel and push your thumb away from you. Notice which way the muzzle moves: right. Pull your thumb toward you and the muzzle moves left. PUSH RIGHT, PULL LEFT.

c. Elevation. All elevation changes are accomplished with the elevating handwheel. Grasp the elevating handwheel with your left hand, palm down. Pushing your thumb away from you (making the handwheel turn counter clockwise), you will notice the muzzle rises, increasing range. Conversely, pulling your thumb toward you causes the elevating handwheel to rotate clockwise and the muzzle to lower, decreasing range. PUSH UP, PULL DOWN.

d. Thumb rule. To move the muzzle to the right, use your left hand on the traversing handwheel and push with your thumb. To elevate, place your left hand on the elevating handwheel and push with your thumb. Push right and push up--"PUSH RIGHT UP".

20. **Steps to Engage a Target.** This is the sequence of events followed to engage all targets. Before applying these five steps ensure the offset head is centered. Turn the traversing handwheel as far as it will go in one direction and then turn it back to the other side, counting the clicks. Divide by two, and count that many clicks back to the center. At this time loosen the traversing handwheel nut, and slip the traversing handwheel scale so that the zero is lined up with zero index on the T&E itself. Tighten the nut; your T&E is mechanically centered.

a. Estimated range. The gunner places the estimated range on the rear sight by pressing in on the slide release and moving the rear sight slide up or down.



Side view 200-800 meters

Rear view 800-1800 meters

Figure 18. The rear sight

- b. Lay for direction
    - (1) Make major directional changes with the traversing slide.
    - (2) Make minor directional changes with the traversing handwheel.
  - c. Lay for elevation. Use the elevating handwheel.
  - d. Rear sight. The team leader lowers the rear sight.
  - e. Fire and adjust onto the target. The team leader will observe the beaten zone and direct the gunner onto the target. The gunner will utilize the T&E mechanism to make his adjustments.
21. **Reapplying Data.** Once the predetermined data has been prepared for a target, the tripod should not be moved, and the T&E should not be replaced or the data will be invalid.
- a. Direction. With the offset head centered, move the muzzle to the correct side of center, and place the left edge of the traversing bar slide on the appropriate reading.
  - b. Elevation. Turn the elevating handwheel until the correct reading is displayed on the upper elevating screw with scale. Continue to turn until the reading on the elevating handwheel is correct.

